STATE OF NEW YORK PUBLIC SERVICE COMMISSION

CASE 15-E-0302

Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard

CASE 14-M-0101

In the Matter of Reforming the Energy Vision

Comments of SolarCity Corporation

June 9, 2016

On May 12, 2016 the Commission issued a notice seeking comments on the topic of energy storage.[1] SolarCity appreciates the opportunity to comment and applauds the efforts of the New York Department of Public Service Staff and Commission to consider the need for storage with respect to achieving the Clean Energy Standard (CES) and advancing goals of the Reforming the Energy Vision (REV) initiative. SolarCity remains committed to collaborating with stakeholders and the Department to resolve near term barriers to storage deployment.

I. Introduction - Storage Role and CES & REV Objectives

Storage is a critical enabler of CES and REV goals. Deployment of storage enables the grid to handle high penetrations of renewable generation at both the bulk-system and distribution levels. At the bulk-system level, storage provides flexible ramping, which allows the system to handle rapid changes in generation or load without reliance on fossil fuel peaker plants. Storage also shifts excess renewable generation to times of day when the energy is most valuable, thus improving the value and economic viability of renewable generation projects as the penetration of renewables increases. At the distribution level, storage can increase the distributed generation hosting capacity of the distribution grid by shifting energy and providing voltage and power quality support, and also offers planners a more flexible asset that can be deployed quickly in smaller building blocks. Both at the bulk and distribution levels, storage can help to eliminate or defer the cost of transmission and distribution assets that would otherwise be needed to integrate a high penetration of renewable energy. Beyond these applications that support high penetrations of renewable generation, storage can simultaneously provide numerous other values to

[1] CASE 15-E-0302 - Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (issued May 12, 2016).

customers (e.g. backup power and bill management), the distribution grid (e.g. reducing distribution peaks and increasing system efficiency), and the bulk-system (e.g. NYISO market participation) while actively participating in REV markets and tariffs. Storage is uniquely suited to play a major role in REV's goal of having active and animated markets for grid services from DERs.

While storage is extremely important and valuable in the CES and REV, the current policies and energy markets in New York do not enable the full value of storage to be realized, which restricts the opportunities for economically-viable storage deployment. In order to realize the full value of storage, changes must be made to market rules, tariff structures, grid planning and operations, and permitting and interconnection. Once these necessary changes are made, storage will be deployed quickly and cost-effectively, and will simultaneously provide multiple values to customers and the system.[2]

But focusing on these long-term improvements to policy and market rules is not enough to enable the deployment and operation of storage to support CES and REV goals. Additional policy support is required in the near-term to kick-start and animate the storage market. Enabling policies that drive deployment of storage today will allow new market, planning, and operations concepts to be tested and validated at sufficient scale, and will help accelerate storage cost reductions.

The following sections provide specific policy and market recommendations that are important to enable deployment of storage to support CES and REV goals.

II. Recommendations - Enabling Policy

This section describes two recommended policies to kick-start deployment of storage in the near-term: a storage deployment obligation, and a storage incentive program. These policies would work together to ensure that storage can begin to participate in grid services to provide value to the grid and enable higher penetrations of renewable energy, while markets are still under development and while storage costs decline.

[2] Note that a similar vision has been articulated by the California Public Utilities Commission (CPUC) and the California Independent System Operator (CAISO) in their 2014 document, *Advancing and Maximizing the Value of Energy Storage Technology: A California Roadmap*. This vision is being advanced and implemented today through initiatives such as the CPUC/CAISO "Joint Workshop on Multiple-Use Applications and Station Power for Energy Storage" (see: https://www.caiso.com/Documents/IssuePaper-CAISO-CPUCStorageWorkshopMay2-32016.pdf).

a. Storage Deployment Obligation

The most direct way to ensure that storage gets deployed and provides grid value is to impose clear obligations to meet deployment targets.

These deployment targets should be tied to the use of storage for specific types of services that support REV and CES, and not result in under-utilized assets. Specific targets should be established for storage that provides value through participation in relevant markets, contracts, or tariffs that support CES and REV at the (1) transmission-level, (2) distribution-level, and (3) customer-level. Specific targets should be established by year at each system-level for each obligated party.

Tying the obligation to participation in these market-mechanisms at each system level would have the following benefits:

- It ensures that the deployed storage actually provides system value, and that deployments keep pace with anticipated system needs to support CES and REV.
- It ensures that sufficient storage is deployed to support market development and advancements in planning and operations at all system levels.
- It allows for flexibility in storage siting. For example, storage could be distribution-connected or customer-sited and still participate in transmission-level markets and count towards those obligations.

There are several options for assigning the obligation to meet deployment targets. For example, the obligation could be assigned to all load-serving entities, to distribution utilities in their role as a DSP, or to a state agency such as NYSERDA. Given the importance of market design, grid planning, and grid operations to meeting these deployment targets, distribution utilities in their role as a DSP, seem to be the most appropriate choice. Providing distribution utilities with these deployment targets will encourage the utilities to ensure that their DSP development supports deployment and effective use of storage. For example, distribution utilities would be encouraged to update market rules and solicitation requirements to allow the most beneficial use of storage, such as some of the changes recommended in the following section on market mechanisms.

Whichever party is assigned the deployment obligation, it is important that the obligation encourages deployment of customer-owned and third-party owned storage. This would support REV principles of customer choice, active markets, and competition.

It is significant to recognize that New York would not be the first state to impose such storage deployment obligations. California imposed similar obligations on their investor-owned utilities in 2013 in order to support California's renewable energy and greenhouse gas reduction goals. The following table shows how California's initial obligation of 1.3 GW of storage by 2020 was allocated by utility and system-level:

Table 1 – Initial Proposed Energy Storage Procurement Targets (in MW)

Use case category, by utility	2014	2016	2018	2020	Total
Southern California Edison					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal SCE	**90**	**120**	**160**	**210**	**580**
Pacific Gas and Electric					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal PG&E	**90**	**120**	**160**	**210**	**580**
San Diego Gas & Electric					
Transmission	10	15	22	33	80
Distribution	7	10	15	23	55
Customer	3	5	8	14	30
Subtotal SDG&E	**20**	**30**	**45**	**70**	**165**
Total - all 3 utilities	**200**	**270**	**365**	**490**	**1,325**

[3]

Given the development of the storage industry since California's obligations were established in 2013, and New York's ambitious CES and REV goals, it is feasible and important for storage deployment in New York to ramp up on a faster timeline. Analysis by NY-BEST in their 2016 *Energy Storage Roadmap for New York's Electric Grid* showed that an estimated 4 GW of storage is required to accommodate New York's goal of 50% renewable generation. Additional analysis by GE shared in the CES Storage Technical Conference showed a large positive net benefit of $509 Million from the deployment of 4 GW of storage in New York in a 50% renewable generation scenario. If 4 GW of storage is required and is beneficial to support the CES goals, it is crucial to make sure that deployment of storage does not become the bottleneck in achieving the CES. It will take some years to update system operations and planning at the distribution and transmission levels to most effectively take advantage of large fleets of storage resources. To ensure storage does not become the bottleneck, New York should aim to have that 4 GW of storage deployed well in advance of the 2030 CES goal. SolarCity recommends total state-wide storage

[3] CPUC Rulemaking 10-12-007, Decision Adopting Energy Storage Procurement Framework and Design Program, (filed December 16, 2010; approved October 2013).

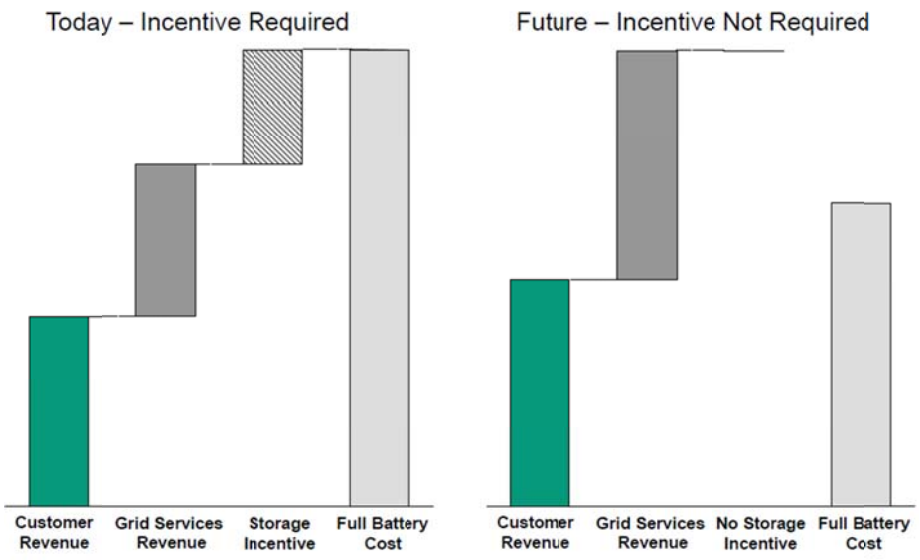
deployment obligations of 2 GW by 2020 and 4 GW by 2025[4], with obligations established for each year between now and 2025. It is also important for the storage obligation to ensure that sufficient total storage energy (i.e. GWh) is available to support renewable integration, while maintaining flexibility for storage systems of various durations to be deployed. Thus, SolarCity recommends establishing associated obligations for the total energy of the deployed storage of **8 GWh by 2020 and 16 GWh by 2025**, based on an average storage duration of 4 hours at the GW targets.

b. Storage Incentive Program

While storage deployment obligations will certainly help to accelerate storage deployment, additional support will likely be required to achieve the deployment targets in early years, particularly in order to meet any customer-sited goals. California, for example, has used on the Self-Generation Incentive Program (SGIP) to support the achievement of storage deployment obligations in early program years and it played a critical role in meeting the customer-sited targets. SolarCity recommends that a program with declining energy storage incentives should also be established in New York to accelerate energy storage market development, accelerate cost reductions, and bridge the time while markets and systems to fully capture the value of storage are being developed. This storage incentive program with declining incentives could build on the success of NY-Sun's MW Block incentive program, and should similarly be included under the Clean Energy Fund.

The figure below illustrates the rationale for a declining storage incentive. The figure shows illustratively that current market opportunities for storage revenues often would not cover the cost of deploying storage, meaning that some incentive is required to enable storage to participate in grid markets. But over time, the opportunities to provide services to and collect revenues from customers and the grid will increase with changing market rules, and the cost of deploying storage will decrease with deployment experience and scale, until a storage incentive is no longer required.

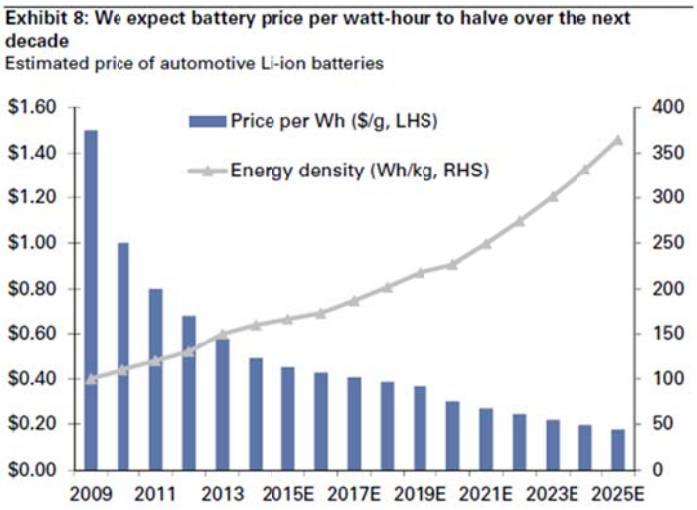
[4] California's storage obligation excluded participation by pumped storage projects greater than 50 MW, because "the sheer size of pumped storage projects would dwarf other smaller, emerging technologies; and as such, would inhibit the fulfillment of market transformation goals." SolarCity recommends that New York also follows this approach, since the development of new distributed storage is important for the success of REV and the CES.



Qualifications to obtain this storage incentive should match the requirements of the storage deployment obligation – specifically that the storage is used to provide value at transmission-level, distribution-level, or customer-level through participation in relevant markets, contracts, or tariffs that support CES and REV. This will ensure that storage projects under this incentive program are receiving market revenues, so that the incentive program only needs to cover part of the cost of the storage systems.

The storage incentive levels and total program size should be consistent with established storage deployment targets between today and 2025, current storage revenue opportunities, and projected storage cost reductions. The following figure shows an example analysis of projected storage cost reductions, which are expected to reduce the need for a storage incentive over time.[5]

[5] Note that the cost projection is based on automotive Li-ion batteries, and as such does not consider stationary energy storage or other storage technologies. Still it is indicative of the general trend of storage cost reductions over time.



[6]

The California Public Utilities Commission recently proposed a new declining-block storage incentive structure for the Self-Generation Incentive Program (shown in the table below), which serves as a good example for New York to consider.

Proposed Incentives for Energy Storage

	Step 1	Step 2	Step 3	Step 4	Step 5
Large Scale Energy Storage (>10 kW)	$0.50/Wh	$0.45/Wh	$0.40/Wh	$0.35/Wh	$0.30/Wh
Small Scale Energy Storage (<=10 kW)	$0.60/Wh	$0.55/Wh	$0.50/Wh	$0.45/Wh	$0.40/Wh

[7]

New York should establish similar incentive blocks, and set a MWh allocation for each block based on the storage deployment target for each year between now and 2025. The separate incentive steps/blocks for small and large scale storage systems supports participation from all customer types, and is consistent with the approach in the NY-Sun MW Block program.

Receipt of storage incentive payments should not influence the treatment of storage projects in tariffs or other market opportunities. Since the goal of the incentive is to accelerate the participation of storage in market opportunities that support CES and REV, it is crucial for storage resources that receive the incentives to be allowed to participate in the relevant tariffs and markets.

[6] Goldman Sachs; *The Great Battery Race*; October 18, 2015. (Note that the legend should read $/Wh rather than $/g).

[7] CPUC Rulemaking 12-11-005; Decision Revising the Self-Generation Incentive Program Pursuant to Senate Bill 861, Assembly Bill 1478, and Implementing Other Changes; May 16, 2016.

III. Enabling Market Mechanisms

a. Tariff-Based Approach to Sourcing

Through REV and the DSIP process, utilities are making strides towards identifying grid system needs, and opportunities for non-traditional resources like DERs, including energy storage, to meet those grid needs. To date, there has been an emphasis on sourcing DERs to meet grid needs through solicitations such as Requests for Proposals (RFPs). These RFPs are positive developments and important vehicles to advance REV objectives, but they represent only a first step in integrating DER sourcing into utility planning processes. These RFPs have been limited in that they are typically tied to specific near-term project deferrals and in that the solicitation process is generally long, non-standardized, and burdensome. An expansion beyond the RFP model will be crucial to enabling effective deployment of storage and attainment of storage deployment targets to support CES and REV.

In order to continue to improve upon the RFP model, SolarCity recommends that utilities further advance efforts to use tariffs as a sourcing mechanism to obtain DERs, including storage, to provide grid values including and beyond infrastructure upgrade deferral. Such tariffs would recognize and provide compensation for the values that DERs provide on system-wide and long-term basis. Deployment of DERs like storage reduces system peaks at multiple levels, and this reduced loading on the system reduces system-wide losses, contributes to extended asset life, and allows for reduced capital investment in grid infrastructure over time. These benefits are valid and should be encouraged whether or not there is a specific load-growth-related system upgrade identified in some near-term planning horizon. Additionally, tariffs could be implemented to recognize the value of DERs like storage to increase the hosting capacity of local circuits or the broader grid, to ensure that the grid is ready to accommodate the renewable generation required to meet CES goals.

Programs like Con Edison's Distribution Load Relief Program (DLRP) and Commercial System Relief Program (CSRP) represent positive starting points for sourcing distribution-system value through tariff-like mechanisms. Future programs should expand beyond this model in the following ways:

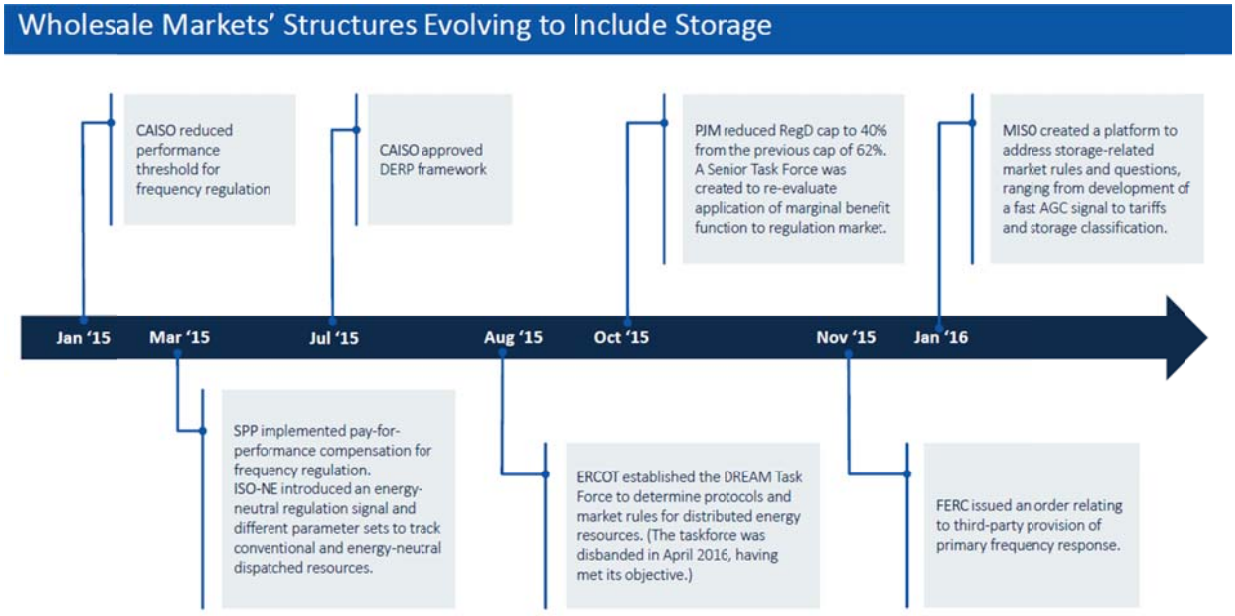
- Implement greater integration with system planning and DER valuation efforts, so that more types of DER values are enabled and credited,

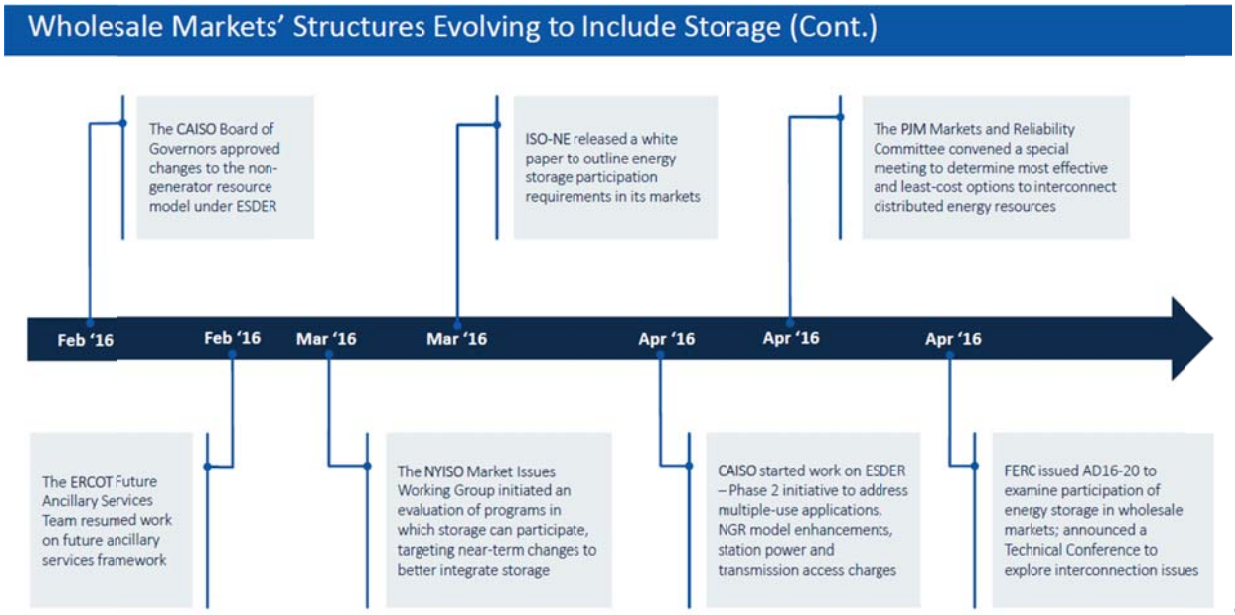
- Provide greater multi-year revenue certainty through tariffs that lock in revenues and operating requirements for grid services over multiple years (e.g. 10 years), to enable financing of new investments and meeting multi-year grid needs,
- Update eligibility rules to allow all technically-feasible and beneficial technologies to participate, including grid-connected and customer-sited storage and resources that export beyond the customer meter, and
- Update operating requirements to allow maximum flexibility for resources like storage to simultaneously participate in multiple market opportunities and value streams.

b. Remove Market Barriers

Many of the current grid market mechanisms do not allow for the most beneficial use of storage, because, even though they are notionally technology-neutral, they were designed with other incumbent technologies in mind. As existing market opportunities are updated, and as new markets are created to support REV and the CES, rules should enable participation of all types of storage wherever it is technically feasible and beneficial.

In general, as shown in the figure below, there has been a national trend towards updating wholesale market structures to facilitate increased participation by storage. In New York, it is important for this trend to continue, while simultaneously opening up more distribution-level and customer-level market opportunities, and coordinating the structures of these opportunities to enable multi-use applications (i.e. when a single resource provides multiple system values).





[8]

The following are some specific issues that must be addressed to enable effective participation by storage in market opportunities:

- Participation rules for market opportunities should be made as expansive as possible, to allow all technically-capable resources to provide system value. In general, systems should be allowed to be located behind or in front of customer meters and should be allowed to export to the grid, as

[8] GTM Research; U.S. Energy Storage Monitor: Q2 2016 Executive Summary; June 2016.

long as the resource is able to provide the relevant service. Many existing demand response programs do not allow storage that can export power beyond the customer meter to participate.

- Coordination is required between customer rate design and compensation for grid services for behind-the-meter resources. In general, participating in a program such as Net Energy Metering (NEM) or a NEM successor should not exclude the customer or resource from participating in other market opportunities. Some current demand response programs may ban NEM customers from participating.
- Clear and sensible rules should be established for when customers with behind-the-meter storage are eligible to participate in NEM or NEM successor tariffs. While requirements for co-location of storage and renewable generation may be appropriate, other requirements should be eliminated that constrain the ability of storage to charge and discharge at times that are most beneficial to the grid.
- If customers participate in time-varying rates, such as Time-of-Use (TOU) rates, customers should be allowed to use credits for excess generation during peak times to offset costs during off-peak times. This enables storage to shift load out of peak hours to help reduce system peaks. Some current TOU programs in New York forbid this by only allowing netting within each time-of-use period.
- Measurement and verification of grid services performance should be updated to appropriately reflect the requirements of the grid need and the nature of the resource. In particular, baseline methodologies which were designed for demand response may not be well suited for customer-sited storage or storage paired with solar generation. Sometimes it may be more appropriate to measure performance at the output of the storage or storage+solar generator, rather than at the customer meter. If the DER provider installs a meter that meets appropriate standards, that meter should be allowed to support measurement and verification.
- Minimum resource size requirements for individual systems and aggregations should be as small as possible, to enable the broadest participation from all technically-capable solutions. For example, NYSIO's "Behind-the-Meter Net Generation Resource" has a minimum size requirement of 2 MW, which restricts the majority of customers from participating.
- Scheduling, dispatch, and operating requirements of various market opportunities should be coordinated to allow resources including storage to simultaneously provide multiple system values, when technically feasible.
- Market-power tests should be updated to allow for resources to participate in multiple markets and revenue streams. Current NYISO rules may limit this option.

c. REC multipliers or Flexible Energy Credits

Associated with the Clean Energy Standard proceeding, there have been discussions of having a REC multiplier for renewable generation bundled with storage or for having a separate market for Flexible Energy Credits. In general, SolarCity believes that these approaches are unlikely to be sufficient on their own to provide sufficient revenue or sufficient revenue certainty to drive storage deployment. Such a policy would likely not be an adequate substitute for a storage incentive program and storage deployment obligations.

Conclusion

SolarCity appreciates the opportunity to comment on the need for a focus on storage in the Clean Energy Standard. As far reaching as the Clean Energy Standard and Reforming the Energy Vision proceedings are, resolution to these fundamental issues must happen before more ambitious programs are implemented. SolarCity looks forward to continued engagement with both Staff and the Commission on this matter.

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